

## Table

Rating Table for Irregular Channel

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.013700	114.02	6.17	18.5	50.12	50.00
0.013800	114.44	6.19	18.5	50.12	50.00
0.013900	114.85	6.21	18.5	50.12	50.00
0.014000	115.27	6.24	18.5	50.12	50.00
0.014100	115.68	6.26	18.5	50.12	50.00
0.014200	116.09	6.28	18.5	50.12	50.00
0.014300	116.49	6.30	18.5	50.12	50.00
0.014400	116.90	6.33	18.5	50.12	50.00
0.014500	117.31	6.35	18.5	50.12	50.00
0.014600	117.71	6.37	18.5	50.12	50.00
0.014700	118.11	6.39	18.5	50.12	50.00
0.014800	118.51	6.41	18.5	50.12	50.00
0.014900	118.91	6.43	18.5	50.12	50.00
0.015000	119.31	6.46	18.5	50.12	50.00
0.015100	119.71	6.48	18.5	50.12	50.00
0.015200	120.10	6.50	18.5	50.12	50.00
0.015300	120.50	6.52	18.5	50.12	50.00
0.015400	120.89	6.54	18.5	50.12	50.00
0.015500	121.28	6.56	18.5	50.12	50.00
0.015600	121.67	6.58	18.5	50.12	50.00
0.015700	122.06	6.60	18.5	50.12	50.00
0.015800	122.45	6.63	18.5	50.12	50.00
0.015900	122.84	6.65	18.5	50.12	50.00
0.016000	123.22	6.67	18.5	50.12	50.00
0.016100	123.61	6.69	18.5	50.12	50.00
0.016200	123.99	6.71	18.5	50.12	50.00
0.016300	124.37	6.73	18.5	50.12	50.00
0.016400	124.76	6.75	18.5	50.12	50.00
0.016500	125.14	6.77	18.5	50.12	50.00
0.016600	125.51	6.79	18.5	50.12	50.00
0.016700	125.89	6.81	18.5	50.12	50.00
0.016800	126.27	6.83	18.5	50.12	50.00
0.016900	126.64	6.85	18.5	50.12	50.00
0.017000	127.02	6.87	18.5	50.12	50.00
0.017100	127.39	6.89	18.5	50.12	50.00
0.017200	127.76	6.91	18.5	50.12	50.00
0.017300	128.13	6.93	18.5	50.12	50.00
0.017400	128.50	6.95	18.5	50.12	50.00
0.017500	128.87	6.97	18.5	50.12	50.00
0.017600	129.24	6.99	18.5	50.12	50.00
0.017700	129.61	7.01	18.5	50.12	50.00
0.017800	129.97	7.03	18.5	50.12	50.00
0.017900	130.34	7.05	18.5	50.12	50.00
0.018000	130.70	7.07	18.5	50.12	50.00
0.018100	131.06	7.09	18.5	50.12	50.00
0.018200	131.42	7.11	18.5	50.12	50.00
0.018300	131.78	7.13	18.5	50.12	50.00
0.018400	132.14	7.15	18.5	50.12	50.00
0.018500	132.50	7.17	18.5	50.12	50.00
0.018600	132.86	7.19	18.5	50.12	50.00
0.018700	133.22	7.21	18.5	50.12	50.00
0.018800	133.57	7.23	18.5	50.12	50.00
0.018900	133.93	7.25	18.5	50.12	50.00

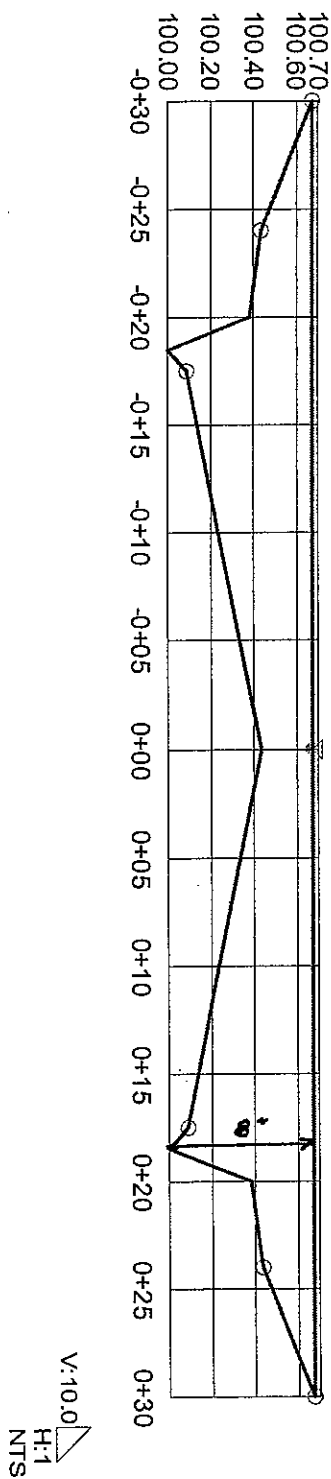
## Table

Rating Table for Irregular Channel

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.019000	134.28	7.27	18.5	50.12	50.00
0.019100	134.63	7.28	18.5	50.12	50.00
0.019200	134.99	7.30	18.5	50.12	50.00
0.019300	135.34	7.32	18.5	50.12	50.00
0.019400	135.69	7.34	18.5	50.12	50.00
0.019500	136.04	7.36	18.5	50.12	50.00
0.019600	136.38	7.38	18.5	50.12	50.00
0.019700	136.73	7.40	18.5	50.12	50.00
0.019800	137.08	7.42	18.5	50.12	50.00
0.019900	137.42	7.44	18.5	50.12	50.00
0.020000	137.77	7.45	18.5	50.12	50.00

## Cross Section Cross Section for Irregular Channel

Project Description	
Worksheet	Collector Str 60" F
Flow Element	Irregular Channel
Method	Manning's Formu
Solve For	Discharge
Section Data	
Mannings Coefficient	0.014
Channel Slope	0.005000 ft/ft
Water Surface Elev.	100.67 ft
Elevation Range	1.00 to 100.67
Discharge	73.88 cfs



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Stanley Consultants, Inc  
Project Engineer: Information Services  
FlowMaster v7.0 [7.0005]  
Page 1 of 1

ST-RH036575

## Table

## Rating Table for Irregular Channel

Project Description	
Worksheet	Collector Str 60"P
Flow Element	Irregular Channel
Method	Manning's Formu
Solve For	Discharge

Input Data
Water Surface Elev. 00.67 ft

Options
Current Roughness Method used Lotter's Method
Open Channel Weighting used Lotter's Method
Closed Channel Weighting Horton's Method

Attribute	Minimum	Maximum	Increment
Channel Slope (ft/ft)	0.005000	0.020000	0.000100

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.005000	73.88	3.58	20.7	60.12	60.00
0.005100	74.61	3.61	20.7	60.12	60.00
0.005200	75.34	3.65	20.7	60.12	60.00
0.005300	76.06	3.68	20.7	60.12	60.00
0.005400	76.78	3.72	20.7	60.12	60.00
0.005500	77.49	3.75	20.7	60.12	60.00
0.005600	78.19	3.79	20.7	60.12	60.00
0.005700	78.88	3.82	20.7	60.12	60.00
0.005800	79.57	3.85	20.7	60.12	60.00
0.005900	80.25	3.89	20.7	60.12	60.00
0.006000	80.93	3.92	20.7	60.12	60.00
0.006100	81.60	3.95	20.7	60.12	60.00
0.006200	82.27	3.98	20.7	60.12	60.00
0.006300	82.93	4.02	20.7	60.12	60.00
0.006400	83.59	4.05	20.7	60.12	60.00
0.006500	84.24	4.08	20.7	60.12	60.00
0.006600	84.88	4.11	20.7	60.12	60.00
0.006700	85.52	4.14	20.7	60.12	60.00
0.006800	86.16	4.17	20.7	60.12	60.00
0.006900	86.79	4.20	20.7	60.12	60.00
0.007000	87.42	4.23	20.7	60.12	60.00
0.007100	88.04	4.26	20.7	60.12	60.00
0.007200	88.66	4.29	20.7	60.12	60.00
0.007300	89.27	4.32	20.7	60.12	60.00
0.007400	89.88	4.35	20.7	60.12	60.00
0.007500	90.48	4.38	20.7	60.12	60.00
0.007600	91.08	4.41	20.7	60.12	60.00
0.007700	91.68	4.44	20.7	60.12	60.00
0.007800	92.28	4.47	20.7	60.12	60.00
0.007900	92.87	4.50	20.7	60.12	60.00
0.008000	93.45	4.52	20.7	60.12	60.00
0.008100	94.03	4.55	20.7	60.12	60.00
0.008200	94.61	4.58	20.7	60.12	60.00
0.008300	95.19	4.61	20.7	60.12	60.00

## Table

## Rating Table for Irregular Channel

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.008400	95.76	4.64	20.7	60.12	60.00
0.008500	96.33	4.66	20.7	60.12	60.00
0.008600	96.89	4.69	20.7	60.12	60.00
0.008700	97.45	4.72	20.7	60.12	60.00
0.008800	98.01	4.75	20.7	60.12	60.00
0.008900	98.57	4.77	20.7	60.12	60.00
0.009000	99.12	4.80	20.7	60.12	60.00
0.009100	99.67	4.83	20.7	60.12	60.00
0.009200	100.21	4.85	20.7	60.12	60.00
0.009300	100.76	4.88	20.7	60.12	60.00
0.009400	101.30	4.90	20.7	60.12	60.00
0.009500	101.84	4.93	20.7	60.12	60.00
0.009600	102.37	4.96	20.7	60.12	60.00
0.009700	102.90	4.98	20.7	60.12	60.00
0.009800	103.43	5.01	20.7	60.12	60.00
0.009900	103.96	5.03	20.7	60.12	60.00
0.010000	104.48	5.06	20.7	60.12	60.00
0.010100	105.00	5.08	20.7	60.12	60.00
0.010200	105.52	5.11	20.7	60.12	60.00
0.010300	106.04	5.13	20.7	60.12	60.00
0.010400	106.55	5.16	20.7	60.12	60.00
0.010500	107.06	5.18	20.7	60.12	60.00
0.010600	107.57	5.21	20.7	60.12	60.00
0.010700	108.08	5.23	20.7	60.12	60.00
0.010800	108.58	5.26	20.7	60.12	60.00
0.010900	109.08	5.28	20.7	60.12	60.00
0.011000	109.58	5.31	20.7	60.12	60.00
0.011100	110.08	5.33	20.7	60.12	60.00
0.011200	110.57	5.35	20.7	60.12	60.00
0.011300	111.07	5.38	20.7	60.12	60.00
0.011400	111.56	5.40	20.7	60.12	60.00
0.011500	112.04	5.42	20.7	60.12	60.00
0.011600	112.53	5.45	20.7	60.12	60.00
0.011700	113.01	5.47	20.7	60.12	60.00
0.011800	113.50	5.49	20.7	60.12	60.00
0.011900	113.98	5.52	20.7	60.12	60.00
0.012000	114.45	5.54	20.7	60.12	60.00
0.012100	114.93	5.56	20.7	60.12	60.00
0.012200	115.40	5.59	20.7	60.12	60.00
0.012300	115.88	5.61	20.7	60.12	60.00
0.012400	116.35	5.63	20.7	60.12	60.00
0.012500	116.81	5.66	20.7	60.12	60.00
0.012600	117.28	5.68	20.7	60.12	60.00
0.012700	117.74	5.70	20.7	60.12	60.00
0.012800	118.21	5.72	20.7	60.12	60.00
0.012900	118.67	5.75	20.7	60.12	60.00
0.013000	119.13	5.77	20.7	60.12	60.00
0.013100	119.58	5.79	20.7	60.12	60.00
0.013200	120.04	5.81	20.7	60.12	60.00
0.013300	120.49	5.83	20.7	60.12	60.00
0.013400	120.95	5.86	20.7	60.12	60.00
0.013500	121.40	5.88	20.7	60.12	60.00
0.013600	121.85	5.90	20.7	60.12	60.00

Table  
Rating Table for Irregular Channel

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.013700	122.29	5.92	20.7	60.12	60.00
0.013800	122.74	5.94	20.7	60.12	60.00
0.013900	123.18	5.96	20.7	60.12	60.00
0.014000	123.62	5.99	20.7	60.12	60.00
0.014100	124.06	6.01	20.7	60.12	60.00
0.014200	124.50	6.03	20.7	60.12	60.00
0.014300	124.94	6.05	20.7	60.12	60.00
0.014400	125.38	6.07	20.7	60.12	60.00
0.014500	125.81	6.09	20.7	60.12	60.00
0.014600	126.25	6.11	20.7	60.12	60.00
0.014700	126.68	6.13	20.7	60.12	60.00
0.014800	127.11	6.15	20.7	60.12	60.00
0.014900	127.54	6.17	20.7	60.12	60.00
0.015000	127.96	6.20	20.7	60.12	60.00
0.015100	128.39	6.22	20.7	60.12	60.00
0.015200	128.81	6.24	20.7	60.12	60.00
0.015300	129.24	6.26	20.7	60.12	60.00
0.015400	129.66	6.28	20.7	60.12	60.00
0.015500	130.08	6.30	20.7	60.12	60.00
0.015600	130.50	6.32	20.7	60.12	60.00
0.015700	130.91	6.34	20.7	60.12	60.00
0.015800	131.33	6.36	20.7	60.12	60.00
0.015900	131.75	6.38	20.7	60.12	60.00
0.016000	132.16	6.40	20.7	60.12	60.00
0.016100	132.57	6.42	20.7	60.12	60.00
0.016200	132.98	6.44	20.7	60.12	60.00
0.016300	133.39	6.46	20.7	60.12	60.00
0.016400	133.80	6.48	20.7	60.12	60.00
0.016500	134.21	6.50	20.7	60.12	60.00
0.016600	134.61	6.52	20.7	60.12	60.00
0.016700	135.02	6.54	20.7	60.12	60.00
0.016800	135.42	6.56	20.7	60.12	60.00
0.016900	135.83	6.58	20.7	60.12	60.00
0.017000	136.23	6.60	20.7	60.12	60.00
0.017100	136.63	6.61	20.7	60.12	60.00
0.017200	137.03	6.63	20.7	60.12	60.00
0.017300	137.42	6.65	20.7	60.12	60.00
0.017400	137.82	6.67	20.7	60.12	60.00
0.017500	138.22	6.69	20.7	60.12	60.00
0.017600	138.61	6.71	20.7	60.12	60.00
0.017700	139.00	6.73	20.7	60.12	60.00
0.017800	139.40	6.75	20.7	60.12	60.00
0.017900	139.79	6.77	20.7	60.12	60.00
0.018000	140.18	6.79	20.7	60.12	60.00
0.018100	140.57	6.81	20.7	60.12	60.00
0.018200	140.95	6.82	20.7	60.12	60.00
0.018300	141.34	6.84	20.7	60.12	60.00
0.018400	141.73	6.86	20.7	60.12	60.00
0.018500	142.11	6.88	20.7	60.12	60.00
0.018600	142.49	6.90	20.7	60.12	60.00
0.018700	142.88	6.92	20.7	60.12	60.00
0.018800	143.26	6.94	20.7	60.12	60.00
0.018900	143.64	6.95	20.7	60.12	60.00

**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.019000	144.02	6.97	20.7	60.12	60.00
0.019100	144.40	6.99	20.7	60.12	60.00
0.019200	144.77	7.01	20.7	60.12	60.00
0.019300	145.15	7.03	20.7	60.12	60.00
0.019400	145.53	7.05	20.7	60.12	60.00
0.019500	145.90	7.06	20.7	60.12	60.00
0.019600	146.27	7.08	20.7	60.12	60.00
0.019700	146.65	7.10	20.7	60.12	60.00
0.019800	147.02	7.12	20.7	60.12	60.00
0.019900	147.39	7.14	20.7	60.12	60.00
0.020000	147.76	7.15	20.7	60.12	60.00

GOLDEN VALLEY RANCH

## **APPENDIX D**

### **PUBLIC R/W DRAINAGE IMPROVEMENTS**

- **INLET CALCULATIONS**
- **HYDRAULIC CALCULATIONS – WEST LOOP ROAD**
- **CULVERT CAPACITY (J-C26, J-N5, J-N25, J-H, & J-N2)**



FHWA Urban Drainage Design Program, HY-22  
Drainage of Highway PavementsInlets on Grade  
Date: 03/17/2006Project No. :18449 - West Loop Road  
Project Name.:Golden Valley Ranch  
Computed by :rjm

## Project Description

STATION 149+00  
INLETS N & S

Inlets on Grade: Curb Opening, Grate Inlet

## Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0105
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0833
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	2.00
Q	Discharge (cfs)	7.500
T	Width of Spread (ft)	14.80

## Gutter Flow

Eo	Gutter Flow Ratio	0.301
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	3.32

## Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	20.58	2.75	0.12	0.875	6.625
Parallel Bar P-1-7/8	1.50	1.38	0.34	2.247	4.379
Combination			0.42	3.121	4.379

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22  
Drainage of Highway Pavements

Inlets on Grade  
Date: 03/17/2006

Project No. :18449 - West Loop Road  
Project Name.:Golden Valley Ranch  
Computed by :rjm

Project Description

STATION 140+50  
INLETS N & S

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0105
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0833
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	2.00
Q	Discharge (cfs)	6.800
T	Width of Spread (ft)	14.23

Gutter Flow

Eo	Gutter Flow Ratio	0.313
d	Depth of Flow (ft)	0.38
V	Average Velocity (ft/sec)	3.24

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	19.40	2.75	0.12	0.840	5.960
Parallel Bar P-1-7/8	1.50	1.38	0.35	2.108	3.853
Combination			0.43	2.947	3.853

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22  
Drainage of Highway Pavements

Inlets on Grade  
Date: 03/17/2006

Project No. :18449 - West Loop Road  
Project Name.:Golden Valley Ranch  
Computed by :rjm

Project Description

STATION 135+50  
INLETS N & S

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0833
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	2.00
Q	Discharge (cfs)	5.300
T	Width of Spread (ft)	13.60

Gutter Flow

Eo	Gutter Flow Ratio	0.328
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	2.76

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	15.78	2.75	0.15	0.799	4.501
Parallel Bar P-1-7/8	1.50	1.38	0.38	1.713	2.788
Combination			0.47	2.512	2.788

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22  
Drainage of Highway Pavements

Inlets on Grade  
Date: 03/17/2006

Project No. :18449 - West Loop Road  
Project Name.:Golden Valley Ranch  
Computed by :rjm

Project Description

STATION 128+50  
INLETS N & S

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0833
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	2.00
Q	Discharge (cfs)	2.800
T	Width of Spread (ft)	10.48

Gutter Flow

Eo	Gutter Flow Ratio	0.426
d	Depth of Flow (ft)	0.30
V	Average Velocity (ft/sec)	2.39

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	10.71	2.75	0.22	0.611	2.189
Parallel Bar P-1-7/8	1.50	1.38	0.50	1.099	1.090
Combination			0.61	1.710	1.090

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22  
Drainage of Highway Pavements

Inlets on Grade  
Date: 03/17/2006

Project No. :18449 - West Loop Road  
Project Name.:Golden Valley Ranch  
Computed by :rjm

Project Description

STATION 125+00  
INLETS N & S

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0833
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	2.00
Q	Discharge (cfs)	2.100
T	Width of Spread (ft)	9.28

Gutter Flow

Eo	Gutter Flow Ratio	0.478
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	2.25

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	8.98	2.75	0.26	0.541	1.559
Parallel Bar P-1-7/8	1.50	1.38	0.57	0.887	0.672
Combination			0.68	1.428	0.672

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

F 0 5 1 5 P

PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

GOLDEN VALLEY RANCH

HEADING LINE NO 2 IS -

GOLDEN VALLEY

HEADING LINE NO 3 IS -

MAIN STORM DRAIN ON WEST LOOP ROAD

ST-RH036586

DATE: 3/ 8/2006  
TIME: 17:48

F0515P  
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	84	4			7.00														
CD	72	4			6.00														
CD	30	4			4.00														
CD	66	4			5.50														
CD	24	4			2.00														
CD	36	4			3.00														

WLPR  
West loop road

F 0 5 1 5 P

PAGE NO 2

## WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV								
			100.00	2468.21	84	2475.00								
ELEMENT NO	2 IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
			277.00	2469.17	84	0.013	0.00	0.00	53.00	0				
ELEMENT NO	3 IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			282.00	2469.19	84	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00
ELEMENT NO	4 IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
			554.00	2470.56	84	0.013	0.00	0.00	0.00	0				
ELEMENT NO	5 IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			559.00	2470.58	84	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00
ELEMENT NO	6 IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
			656.00	2471.06	84	0.013	0.00	0.00	6.00	0				
ELEMENT NO	7 IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			661.00	2471.08	84	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00
ELEMENT NO	8 IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H				
			808.00	2471.83	84	0.013	0.00	0.00	6.00	0				
ELEMENT NO	9 IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
			813.00	2471.85	84	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00

ST-RH036588



F 0 5 1 5 P

PAGE NO 3

## WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	REACH	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
10	IS A REACH		965.00	2472.61	84	0.013	0.00	0.00	5.00	0
11	IS A JUNCTION		970.00	2472.63	84	0	0	0.013	0.0	0.0
12	IS A REACH		1077.00	2473.17	84	0.013	0.00	0.00	5.00	0
13	IS A JUNCTION		1082.00	2473.19	84	0	0	0.013	0.0	0.0
14	IS A REACH		1217.00	2473.87	84	0.013	0.00	0.00	6.00	0
15	IS A JUNCTION		1222.00	2473.89	84	0	0	0.013	0.0	0.0
16	IS A REACH		1275.00	2474.16	84	0.013	0.00	0.00	0.00	0
17	IS A JUNCTION		1280.00	2474.18	84	24	0	0.013	66.0	0.0
18	IS A REACH		1680.00	2476.18	84	0.013	0.00	0.00	0.00	0
19	IS A JUNCTION		1685.00	2476.20	84	0	0	0.013	0.0	0.0

ST-RH036589

F 0 5 1 5 P

PAGE NO 4

## WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	REACH	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
20	IS A	REACH	1827.00	2476.92	84	0.013	0.00	0.00	0.00	0
21	IS A	JUNCTION	1832.00	2476.94	84	0	0	0.013	0.0	0.0
22	IS A	REACH	2010.00	2477.83	84	0.013	0.00	0.00	0.00	0
23	IS A	JUNCTION	2015.00	2477.85	84	0	0	0.013	0.0	0.0
24	IS A	REACH	2154.00	2478.55	84	0.013	0.00	0.00	0.00	0
25	IS A	JUNCTION	2159.00	2478.57	72	36	0	0.013	107.0	0.0
26	IS A	REACH	2277.00	2479.17	72	0.013	0.00	0.00	0.00	0
27	IS A	JUNCTION	2282.00	2479.19	72	0	0	0.013	0.0	0.0
28	IS A	REACH	2457.00	2480.07	72	0.013	0.00	0.00	0.00	0
29	IS A	JUNCTION	2462.00	2480.09	72	0	0	0.013	0.0	0.0

ST-RH036590

F 0 5 1 5 P

PAGE NO 5

## WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	IS A	REACH	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
30	IS A REACH		2643.00	2481.00	72	0.013	0.00	0.00	6.00	0
31	IS A JUNCTION		2648.00	2481.02	72	0	0.0	0.0	0.00	0.00
32	IS A REACH		2802.00	2481.80	72	0.013	0.00	0.00	0.00	0
33	IS A JUNCTION		2807.00	2481.82	72	0	0.0	0.0	0.00	0.00
34	IS A REACH		2970.00	2482.64	72	0.013	0.00	0.00	0.00	0
35	IS A JUNCTION		2975.00	2482.66	72	30	0.013	39.0	0.0	2482.66

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO	IS A	REACH	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
36	IS A REACH		3145.00	2483.51	66	0.013	0.00	0.00	0.00	0

ELEMENT NO	IS A	SYSTEM HEADWORKS	STATION	INVERT	SECT	W S ELEV
37	IS A		3145.00	2483.51	66	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

\*\* WARNING NO. 2 \*\* - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

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F0515P  
WATER SURFACE PROFILE LISTING

PAGE 1

GOLDEN VALLEY RANCH  
GOLDEN VALLEY  
MAIN STORM DRAIN ON WEST LOOP ROAD

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
100.00	2468.21	6.790	2475.000	465.0	12.19	2.307	2477.307	0.00	5.659	7.00	0.00	0.00	0	0.00
177.00	0.00542					.004622	0.82		5.665			0.00		
277.00	2469.17	6.568	2475.738	465.0	12.40	2.387	2478.125	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004579	0.02					0.00		
282.00	2469.19	6.573	2475.763	465.0	12.39	2.385	2478.148	0.00	5.659	7.00	0.00	0.00	0	0.00
272.00	0.00504					.004609	1.25		5.913			0.00		
554.00	2470.56	6.344	2476.904	465.0	12.68	2.498	2479.402	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004638	0.02					0.00		
559.00	2470.58	6.351	2476.931	465.0	12.67	2.494	2479.425	0.00	5.659	7.00	0.00	0.00	0	0.00
97.00	0.00495					.004655	0.45		5.984			0.00		
656.00	2471.06	6.285	2477.345	465.0	12.77	2.531	2479.876	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004671	0.02					0.00		
661.00	2471.08	6.293	2477.373	465.0	12.76	2.527	2479.900	0.00	5.659	7.00	0.00	0.00	0	0.00
147.00	0.00510					.004724	0.69		5.865			0.00		
808.00	2471.83	6.145	2477.975	465.0	12.99	2.620	2480.595	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004776	0.02					0.00		
813.00	2471.85	6.156	2478.006	465.0	12.97	2.612	2480.618	0.00	5.659	7.00	0.00	0.00	0	0.00
152.00	0.00500					.004815	0.73		5.942			0.00		
965.00	2472.61	6.065	2478.675	465.0	13.13	2.675	2481.350	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004851	0.02					0.00		
970.00	2472.63	6.080	2478.710	465.0	13.10	2.665	2481.375	0.00	5.659	7.00	0.00	0.00	0	0.00
107.00	0.00505					.004879	0.52		5.906			0.00		

ST-RH036592

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F0515P  
WATER SURFACE PROFILE LISTING

PAGE 2

GOLDEN VALLEY RANCH  
GOLDEN VALLEY  
MAIN STORM DRAIN ON WEST LOOP ROAD

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
1077.00	2473.17	6.013	2479.183	465.0	13.22	2.713	2481.896	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004905	0.02					0.00		
1082.00	2473.19	6.031	2479.221	465.0	13.19	2.700	2481.921	0.00	5.659	7.00	0.00	0.00	0	0.00
135.00	0.00504					.004929	0.67		5.913			0.00		
1217.00	2473.87	5.971	2479.841	465.0	13.30	2.746	2482.587	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004952	0.02					0.00		
1222.00	2473.89	5.991	2479.881	465.0	13.26	2.730	2482.611	0.00	5.659	7.00	0.00	0.00	0	0.00
53.00	0.00509					.004959	0.26		5.871			0.00		
1275.00	2474.16	5.960	2480.120	465.0	13.32	2.755	2482.875	0.00	5.659	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004439	0.02					0.00		
1280.00	2474.18	7.702	2481.882	399.0	10.37	1.669	2483.551	0.00	5.264	7.00	0.00	0.00	0	0.00
400.00	0.00500					.003901	1.56		5.112			0.00		
1680.00	2476.18	7.263	2483.443	399.0	10.37	1.669	2485.112	0.00	5.264	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.003901	0.02					0.00		
1685.00	2476.20	7.262	2483.462	399.0	10.37	1.669	2485.131	0.00	5.264	7.00	0.00	0.00	0	0.00
142.00	0.00507					.003901	0.55		5.083			0.00		
1827.00	2476.92	7.096	2484.016	399.0	10.37	1.669	2485.685	0.00	5.264	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.003901	0.02					0.00		
1832.00	2476.94	7.095	2484.035	399.0	10.37	1.669	2485.704	0.00	5.264	7.00	0.00	0.00	0	0.00
86.88	0.00500					.003881	0.34		5.112			0.00		
1918.88	2477.37	7.000	2484.374	399.0	10.37	1.669	2486.043	0.00	5.264	7.00	0.00	0.00	0	0.00
91.12	0.00500					.003679	0.34		5.112			0.00		

ST-RH036593

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F0515P  
WATER SURFACE PROFILE LISTING

PAGE 3

GOLDEN VALLEY RANCH  
GOLDEN VALLEY  
MAIN STORM DRAIN ON WEST LOOP ROAD

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
2010.00	2477.83	6.863	2484.693	399.0	10.42	1.685	2486.378	0.00	5.264	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.003496	0.02					0.00		
2015.00	2477.85	6.860	2484.710	399.0	10.42	1.685	2486.395	0.00	5.264	7.00	0.00	0.00	0	0.00
139.00	0.00504					.003432	0.48		5.097			0.00		
2154.00	2478.55	6.563	2485.113	399.0	10.64	1.759	2486.872	0.00	5.264	7.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004063	0.02					0.00		
2159.00	2478.57	7.727	2486.297	292.0	10.33	1.656	2487.953	0.00	4.674	6.00	0.00	0.00	0	0.00
118.00	0.00509					.004754	0.56		4.748			0.00		
2277.00	2479.17	7.688	2486.858	292.0	10.33	1.656	2488.514	0.00	4.674	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004754	0.02					0.00		
2282.00	2479.19	7.691	2486.881	292.0	10.33	1.656	2488.537	0.00	4.674	6.00	0.00	0.00	0	0.00
175.00	0.00503					.004754	0.83		4.774			0.00		
2457.00	2480.07	7.643	2487.713	292.0	10.33	1.656	2489.369	0.00	4.674	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004754	0.02					0.00		
2462.00	2480.09	7.647	2487.737	292.0	10.33	1.656	2489.393	0.00	4.674	6.00	0.00	0.00	0	0.00
181.00	0.00503					.004754	0.86		4.775			0.00		
2643.00	2481.00	7.630	2488.630	292.0	10.33	1.656	2490.286	0.00	4.674	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004754	0.02					0.00		
2648.00	2481.02	7.634	2488.654	292.0	10.33	1.656	2490.310	0.00	4.674	6.00	0.00	0.00	0	0.00
154.00	0.00507					.004754	0.73		4.757			0.00		
2802.00	2481.80	7.586	2489.386	292.0	10.33	1.656	2491.042	0.00	4.674	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004754	0.02					0.00		

ST-RH036594

LICENSEE: STANLEY CONSULTANTS, INC.

F0515P  
WATER SURFACE PROFILE LISTING

PAGE 4

GOLDEN VALLEY RANCH  
GOLDEN VALLEY  
MAIN STORM DRAIN ON WEST LOOP ROAD

STATION	INVERT ELV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVEPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
2807.00	2481.82	7.590	2489.410	292.0	10.33	1.656	2491.066	0.00	4.674	6.00	0.00	0.00	0	0.00
163.00	0.00503					.004754	0.77		4.773			0.00		
2970.00	2482.64	7.545	2490.185	292.0	10.33	1.656	2491.841	0.00	4.674	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00400					.004162	0.02					0.00		
2975.00	2482.66	8.238	2490.898	253.0	10.65	1.761	2492.659	0.00	4.435	5.50	0.00	0.00	0	0.00
170.00	0.00500					.005676	0.96		4.945			0.00		
3145.00	2483.51	8.353	2491.863	253.0	10.65	1.761	2493.624	0.00	4.435	5.50	0.00	0.00	0	0.00

ST-RH036595

## NOTES

## 1. GLOSSARY

- ST-RH036596

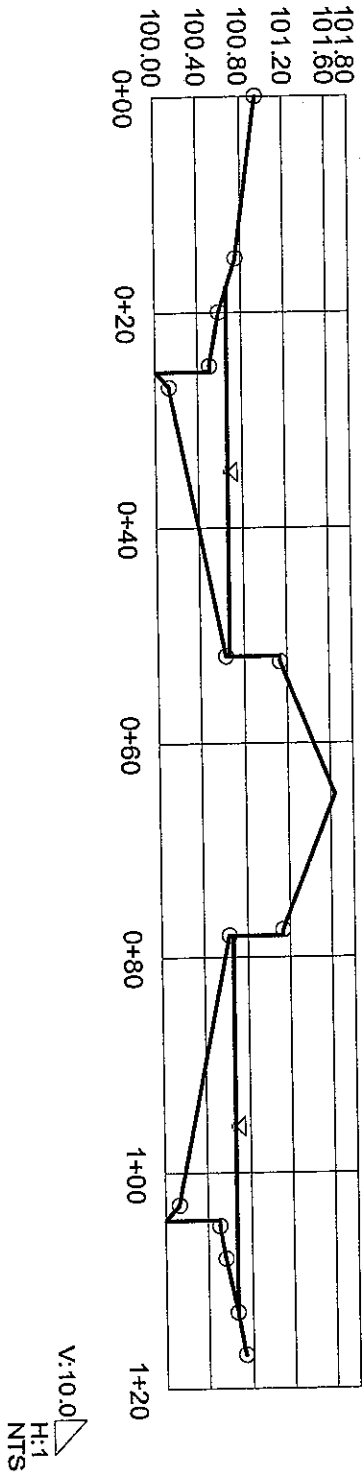


Y = WALL ENTRANCE OR EXIT  
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

ST-RH036597

# Cross Section Cross Section for Irregular Channel 3' MEET APPARENT @ 8' DEEP (@ BUTTER FL.)

Project Description	
Worksheet	West Loop Rd 117RAW
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge
Section Data	
Mannings Coefficient	0.014
Channel Slope	0.005000 ft/ft
Water Surface Elevation	100.67 ft
Elevation Range	100.00 to 101.63
Discharge	53.12 cfs



q:\18449\drainage calcs\street flow.fm2  
02/22/06 10:24:36 AM

Stanley Consultants, Inc.  
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Information Services  
FlowMaster v7.0 [7.0005]  
Page 1 of 1

ST-RH036598

**Table**  
**Rating Table for Irregular Channel**

Project Description	
Worksheet	West Loop Rd 117R/W
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Water Surface Elevation	100.67 ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Attribute	Minimum	Maximum	Increment
Channel Slope (ft/ft)	0.005000	0.020000	0.000100

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.005000	53.12	2.93	18.1	70.95	69.83
0.005100	53.65	2.96	18.1	70.95	69.83
0.005200	54.17	2.99	18.1	70.95	69.83
0.005300	54.69	3.01	18.1	70.95	69.83
0.005400	55.21	3.04	18.1	70.95	69.83
0.005500	55.71	3.07	18.1	70.95	69.83
0.005600	56.22	3.10	18.1	70.95	69.83
0.005700	56.72	3.13	18.1	70.95	69.83
0.005800	57.21	3.15	18.1	70.95	69.83
0.005900	57.70	3.18	18.1	70.95	69.83
0.006000	58.19	3.21	18.1	70.95	69.83
0.006100	58.67	3.23	18.1	70.95	69.83
0.006200	59.15	3.26	18.1	70.95	69.83
0.006300	59.63	3.29	18.1	70.95	69.83
0.006400	60.10	3.31	18.1	70.95	69.83
0.006500	60.57	3.34	18.1	70.95	69.83
0.006600	61.03	3.36	18.1	70.95	69.83
0.006700	61.49	3.39	18.1	70.95	69.83
0.006800	61.95	3.41	18.1	70.95	69.83
0.006900	62.40	3.44	18.1	70.95	69.83
0.007000	62.85	3.46	18.1	70.95	69.83
0.007100	63.30	3.49	18.1	70.95	69.83
0.007200	63.75	3.51	18.1	70.95	69.83
0.007300	64.19	3.54	18.1	70.95	69.83
0.007400	64.62	3.56	18.1	70.95	69.83
0.007500	65.06	3.59	18.1	70.95	69.83
0.007600	65.49	3.61	18.1	70.95	69.83
0.007700	65.92	3.63	18.1	70.95	69.83
0.007800	66.35	3.66	18.1	70.95	69.83
0.007900	66.77	3.68	18.1	70.95	69.83
0.008000	67.19	3.70	18.1	70.95	69.83
0.008100	67.61	3.73	18.1	70.95	69.83
0.008200	68.03	3.75	18.1	70.95	69.83
0.008300	68.44	3.77	18.1	70.95	69.83

**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.008400	68.85	3.79	18.1	70.95	69.83
0.008500	69.26	3.82	18.1	70.95	69.83
0.008600	69.67	3.84	18.1	70.95	69.83
0.008700	70.07	3.86	18.1	70.95	69.83
0.008800	70.47	3.88	18.1	70.95	69.83
0.008900	70.87	3.91	18.1	70.95	69.83
0.009000	71.27	3.93	18.1	70.95	69.83
0.009100	71.66	3.95	18.1	70.95	69.83
0.009200	72.06	3.97	18.1	70.95	69.83
0.009300	72.45	3.99	18.1	70.95	69.83
0.009400	72.84	4.01	18.1	70.95	69.83
0.009500	73.22	4.04	18.1	70.95	69.83
0.009600	73.61	4.06	18.1	70.95	69.83
0.009700	73.99	4.08	18.1	70.95	69.83
0.009800	74.37	4.10	18.1	70.95	69.83
0.009900	74.75	4.12	18.1	70.95	69.83
0.010000	75.12	4.14	18.1	70.95	69.83
0.010100	75.50	4.16	18.1	70.95	69.83
0.010200	75.87	4.18	18.1	70.95	69.83
0.010300	76.24	4.20	18.1	70.95	69.83
0.010400	76.61	4.22	18.1	70.95	69.83
0.010500	76.98	4.24	18.1	70.95	69.83
0.010600	77.35	4.26	18.1	70.95	69.83
0.010700	77.71	4.28	18.1	70.95	69.83
0.010800	78.07	4.30	18.1	70.95	69.83
0.010900	78.43	4.32	18.1	70.95	69.83
0.011000	78.79	4.34	18.1	70.95	69.83
0.011100	79.15	4.36	18.1	70.95	69.83
0.011200	79.50	4.38	18.1	70.95	69.83
0.011300	79.86	4.40	18.1	70.95	69.83
0.011400	80.21	4.42	18.1	70.95	69.83
0.011500	80.56	4.44	18.1	70.95	69.83
0.011600	80.91	4.46	18.1	70.95	69.83
0.011700	81.26	4.48	18.1	70.95	69.83
0.011800	81.61	4.50	18.1	70.95	69.83
0.011900	81.95	4.52	18.1	70.95	69.83
0.012000	82.29	4.53	18.1	70.95	69.83
0.012100	82.64	4.55	18.1	70.95	69.83
0.012200	82.98	4.57	18.1	70.95	69.83
0.012300	83.32	4.59	18.1	70.95	69.83
0.012400	83.66	4.61	18.1	70.95	69.83
0.012500	83.99	4.63	18.1	70.95	69.83
0.012600	84.33	4.65	18.1	70.95	69.83
0.012700	84.66	4.67	18.1	70.95	69.83
0.012800	84.99	4.68	18.1	70.95	69.83
0.012900	85.33	4.70	18.1	70.95	69.83
0.013000	85.66	4.72	18.1	70.95	69.83
0.013100	85.98	4.74	18.1	70.95	69.83
0.013200	86.31	4.76	18.1	70.95	69.83
0.013300	86.64	4.77	18.1	70.95	69.83
0.013400	86.96	4.79	18.1	70.95	69.83
0.013500	87.29	4.81	18.1	70.95	69.83
0.013600	87.61	4.83	18.1	70.95	69.83

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ST-RH036600

**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.013700	87.93	4.85	18.1	70.95	69.83
0.013800	88.25	4.86	18.1	70.95	69.83
0.013900	88.57	4.88	18.1	70.95	69.83
0.014000	88.89	4.90	18.1	70.95	69.83
0.014100	89.21	4.92	18.1	70.95	69.83
0.014200	89.52	4.93	18.1	70.95	69.83
0.014300	89.84	4.95	18.1	70.95	69.83
0.014400	90.15	4.97	18.1	70.95	69.83
0.014500	90.46	4.99	18.1	70.95	69.83
0.014600	90.77	5.00	18.1	70.95	69.83
0.014700	91.08	5.02	18.1	70.95	69.83
0.014800	91.39	5.04	18.1	70.95	69.83
0.014900	91.70	5.05	18.1	70.95	69.83
0.015000	92.01	5.07	18.1	70.95	69.83
0.015100	92.31	5.09	18.1	70.95	69.83
0.015200	92.62	5.10	18.1	70.95	69.83
0.015300	92.92	5.12	18.1	70.95	69.83
0.015400	93.23	5.14	18.1	70.95	69.83
0.015500	93.53	5.15	18.1	70.95	69.83
0.015600	93.83	5.17	18.1	70.95	69.83
0.015700	94.13	5.19	18.1	70.95	69.83
0.015800	94.43	5.20	18.1	70.95	69.83
0.015900	94.73	5.22	18.1	70.95	69.83
0.016000	95.03	5.24	18.1	70.95	69.83
0.016100	95.32	5.25	18.1	70.95	69.83
0.016200	95.62	5.27	18.1	70.95	69.83
0.016300	95.91	5.29	18.1	70.95	69.83
0.016400	96.21	5.30	18.1	70.95	69.83
0.016500	96.50	5.32	18.1	70.95	69.83
0.016600	96.79	5.33	18.1	70.95	69.83
0.016700	97.08	5.35	18.1	70.95	69.83
0.016800	97.37	5.37	18.1	70.95	69.83
0.016900	97.66	5.38	18.1	70.95	69.83
0.017000	97.95	5.40	18.1	70.95	69.83
0.017100	98.24	5.41	18.1	70.95	69.83
0.017200	98.52	5.43	18.1	70.95	69.83
0.017300	98.81	5.45	18.1	70.95	69.83
0.017400	99.10	5.46	18.1	70.95	69.83
0.017500	99.38	5.48	18.1	70.95	69.83
0.017600	99.66	5.49	18.1	70.95	69.83
0.017700	99.95	5.51	18.1	70.95	69.83
0.017800	100.23	5.52	18.1	70.95	69.83
0.017900	100.51	5.54	18.1	70.95	69.83
0.018000	100.79	5.55	18.1	70.95	69.83
0.018100	101.07	5.57	18.1	70.95	69.83
0.018200	101.35	5.58	18.1	70.95	69.83
0.018300	101.63	5.60	18.1	70.95	69.83
0.018400	101.90	5.62	18.1	70.95	69.83
0.018500	102.18	5.63	18.1	70.95	69.83
0.018600	102.46	5.65	18.1	70.95	69.83
0.018700	102.73	5.66	18.1	70.95	69.83
0.018800	103.01	5.68	18.1	70.95	69.83
0.018900	103.28	5.69	18.1	70.95	69.83

**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.019000	103.55	5.71	18.1	70.95	69.83
0.019100	103.82	5.72	18.1	70.95	69.83
0.019200	104.10	5.74	18.1	70.95	69.83
0.019300	104.37	5.75	18.1	70.95	69.83
0.019400	104.64	5.77	18.1	70.95	69.83
0.019500	104.91	5.78	18.1	70.95	69.83
0.019600	105.17	5.80	18.1	70.95	69.83
0.019700	105.44	5.81	18.1	70.95	69.83
0.019800	105.71	5.83	18.1	70.95	69.83
0.019900	105.98	5.84	18.1	70.95	69.83
0.020000	106.24	5.85	18.1	70.95	69.83

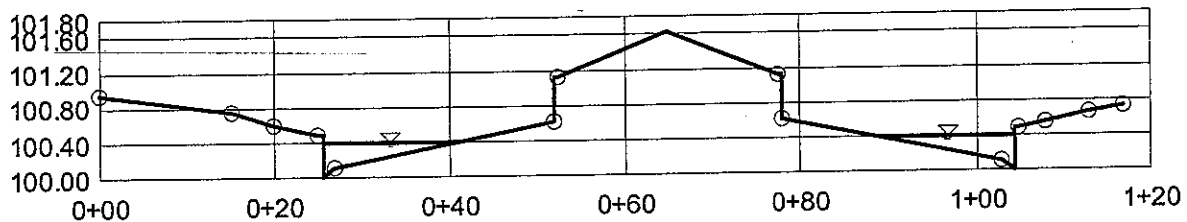
# Cross Section

## Cross Section for Irregular Channel

Project Description	
Worksheet	West Loop Rd 117R/W
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.012500 ft/ft
Water Surface Elevation	100.41 ft
Elevation Range	100.00 to 101.63
Discharge	16.44 cfs

11' TRAVEL LANE (INSIDE) CLEAR.



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**Table**  
**Rating Table for Irregular Channel**

Project Description	
Worksheet	West Loop Rd 117R/W
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Water Surface Elevation	100.41 ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Attribute	Minimum	Maximum	Increment
Channel Slope (ft/ft)	0.005000	0.020000	0.000100

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.005000	10.40	2.10	4.9	31.83	31.00
0.005100	10.50	2.12	4.9	31.83	31.00
0.005200	10.61	2.14	4.9	31.83	31.00
0.005300	10.71	2.16	4.9	31.83	31.00
0.005400	10.81	2.18	4.9	31.83	31.00
0.005500	10.91	2.20	4.9	31.83	31.00
0.005600	11.01	2.22	4.9	31.83	31.00
0.005700	11.10	2.24	4.9	31.83	31.00
0.005800	11.20	2.26	4.9	31.83	31.00
0.005900	11.30	2.28	4.9	31.83	31.00
0.006000	11.39	2.30	4.9	31.83	31.00
0.006100	11.49	2.32	4.9	31.83	31.00
0.006200	11.58	2.34	4.9	31.83	31.00
0.006300	11.67	2.36	4.9	31.83	31.00
0.006400	11.77	2.38	4.9	31.83	31.00
0.006500	11.86	2.40	4.9	31.83	31.00
0.006600	11.95	2.42	4.9	31.83	31.00
0.006700	12.04	2.43	4.9	31.83	31.00
0.006800	12.13	2.45	4.9	31.83	31.00
0.006900	12.22	2.47	4.9	31.83	31.00
0.007000	12.31	2.49	4.9	31.83	31.00
0.007100	12.39	2.50	4.9	31.83	31.00
0.007200	12.48	2.52	4.9	31.83	31.00
0.007300	12.57	2.54	4.9	31.83	31.00
0.007400	12.65	2.56	4.9	31.83	31.00
0.007500	12.74	2.57	4.9	31.83	31.00
0.007600	12.82	2.59	4.9	31.83	31.00
0.007700	12.91	2.61	4.9	31.83	31.00
0.007800	12.99	2.63	4.9	31.83	31.00
0.007900	13.07	2.64	4.9	31.83	31.00
0.008000	13.15	2.66	4.9	31.83	31.00
0.008100	13.24	2.68	4.9	31.83	31.00
0.008200	13.32	2.69	4.9	31.83	31.00
0.008300	13.40	2.71	4.9	31.83	31.00



**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.008400	13.48	2.72	4.9	31.83	31.00
0.008500	13.56	2.74	4.9	31.83	31.00
0.008600	13.64	2.76	4.9	31.83	31.00
0.008700	13.72	2.77	4.9	31.83	31.00
0.008800	13.80	2.79	4.9	31.83	31.00
0.008900	13.88	2.80	4.9	31.83	31.00
0.009000	13.95	2.82	4.9	31.83	31.00
0.009100	14.03	2.84	4.9	31.83	31.00
0.009200	14.11	2.85	4.9	31.83	31.00
0.009300	14.18	2.87	4.9	31.83	31.00
0.009400	14.26	2.88	4.9	31.83	31.00
0.009500	14.34	2.90	4.9	31.83	31.00
0.009600	14.41	2.91	4.9	31.83	31.00
0.009700	14.49	2.93	4.9	31.83	31.00
0.009800	14.56	2.94	4.9	31.83	31.00
0.009900	14.63	2.96	4.9	31.83	31.00
0.010000	14.71	2.97	4.9	31.83	31.00
0.010100	14.78	2.99	4.9	31.83	31.00
0.010200	14.85	3.00	4.9	31.83	31.00
0.010300	14.93	3.02	4.9	31.83	31.00
0.010400	15.00	3.03	4.9	31.83	31.00
0.010500	15.07	3.05	4.9	31.83	31.00
0.010600	15.14	3.06	4.9	31.83	31.00
0.010700	15.21	3.08	4.9	31.83	31.00
0.010800	15.28	3.09	4.9	31.83	31.00
0.010900	15.36	3.10	4.9	31.83	31.00
0.011000	15.43	3.12	4.9	31.83	31.00
0.011100	15.50	3.13	4.9	31.83	31.00
0.011200	15.57	3.15	4.9	31.83	31.00
0.011300	15.63	3.16	4.9	31.83	31.00
0.011400	15.70	3.17	4.9	31.83	31.00
0.011500	15.77	3.19	4.9	31.83	31.00
0.011600	15.84	3.20	4.9	31.83	31.00
0.011700	15.91	3.22	4.9	31.83	31.00
0.011800	15.98	3.23	4.9	31.83	31.00
0.011900	16.04	3.24	4.9	31.83	31.00
0.012000	16.11	3.26	4.9	31.83	31.00
0.012100	16.18	3.27	4.9	31.83	31.00
0.012200	16.25	3.28	4.9	31.83	31.00
0.012300	16.31	3.30	4.9	31.83	31.00
0.012400	16.38	3.31	4.9	31.83	31.00
0.012500	16.44	3.32	4.9	31.83	31.00
0.012600	16.51	3.34	4.9	31.83	31.00
0.012700	16.57	3.35	4.9	31.83	31.00
0.012800	16.64	3.36	4.9	31.83	31.00
0.012900	16.70	3.38	4.9	31.83	31.00
0.013000	16.77	3.39	4.9	31.83	31.00
0.013100	16.83	3.40	4.9	31.83	31.00
0.013200	16.90	3.42	4.9	31.83	31.00
0.013300	16.96	3.43	4.9	31.83	31.00
0.013400	17.03	3.44	4.9	31.83	31.00
0.013500	17.09	3.45	4.9	31.83	31.00
0.013600	17.15	3.47	4.9	31.83	31.00

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ST-RH036605

**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.013700	17.21	3.48	4.9	31.83	31.00
0.013800	17.28	3.49	4.9	31.83	31.00
0.013900	17.34	3.50	4.9	31.83	31.00
0.014000	17.40	3.52	4.9	31.83	31.00
0.014100	17.46	3.53	4.9	31.83	31.00
0.014200	17.53	3.54	4.9	31.83	31.00
0.014300	17.59	3.55	4.9	31.83	31.00
0.014400	17.65	3.57	4.9	31.83	31.00
0.014500	17.71	3.58	4.9	31.83	31.00
0.014600	17.77	3.59	4.9	31.83	31.00
0.014700	17.83	3.60	4.9	31.83	31.00
0.014800	17.89	3.62	4.9	31.83	31.00
0.014900	17.95	3.63	4.9	31.83	31.00
0.015000	18.01	3.64	4.9	31.83	31.00
0.015100	18.07	3.65	4.9	31.83	31.00
0.015200	18.13	3.67	4.9	31.83	31.00
0.015300	18.19	3.68	4.9	31.83	31.00
0.015400	18.25	3.69	4.9	31.83	31.00
0.015500	18.31	3.70	4.9	31.83	31.00
0.015600	18.37	3.71	4.9	31.83	31.00
0.015700	18.43	3.72	4.9	31.83	31.00
0.015800	18.49	3.74	4.9	31.83	31.00
0.015900	18.55	3.75	4.9	31.83	31.00
0.016000	18.60	3.76	4.9	31.83	31.00
0.016100	18.66	3.77	4.9	31.83	31.00
0.016200	18.72	3.78	4.9	31.83	31.00
0.016300	18.78	3.80	4.9	31.83	31.00
0.016400	18.84	3.81	4.9	31.83	31.00
0.016500	18.89	3.82	4.9	31.83	31.00
0.016600	18.95	3.83	4.9	31.83	31.00
0.016700	19.01	3.84	4.9	31.83	31.00
0.016800	19.06	3.85	4.9	31.83	31.00
0.016900	19.12	3.86	4.9	31.83	31.00
0.017000	19.18	3.88	4.9	31.83	31.00
0.017100	19.23	3.89	4.9	31.83	31.00
0.017200	19.29	3.90	4.9	31.83	31.00
0.017300	19.34	3.91	4.9	31.83	31.00
0.017400	19.40	3.92	4.9	31.83	31.00
0.017500	19.46	3.93	4.9	31.83	31.00
0.017600	19.51	3.94	4.9	31.83	31.00
0.017700	19.57	3.95	4.9	31.83	31.00
0.017800	19.62	3.97	4.9	31.83	31.00
0.017900	19.68	3.98	4.9	31.83	31.00
0.018000	19.73	3.99	4.9	31.83	31.00
0.018100	19.79	4.00	4.9	31.83	31.00
0.018200	19.84	4.01	4.9	31.83	31.00
0.018300	19.90	4.02	4.9	31.83	31.00
0.018400	19.95	4.03	4.9	31.83	31.00
0.018500	20.00	4.04	4.9	31.83	31.00
0.018600	20.06	4.05	4.9	31.83	31.00
0.018700	20.11	4.07	4.9	31.83	31.00
0.018800	20.17	4.08	4.9	31.83	31.00
0.018900	20.22	4.09	4.9	31.83	31.00

**Table**  
**Rating Table for Irregular Channel**

Channel Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Top Width (ft)
0.019000	20.27	4.10	4.9	31.83	31.00
0.019100	20.33	4.11	4.9	31.83	31.00
0.019200	20.38	4.12	4.9	31.83	31.00
0.019300	20.43	4.13	4.9	31.83	31.00
0.019400	20.49	4.14	4.9	31.83	31.00
0.019500	20.54	4.15	4.9	31.83	31.00
0.019600	20.59	4.16	4.9	31.83	31.00
0.019700	20.64	4.17	4.9	31.83	31.00
0.019800	20.70	4.18	4.9	31.83	31.00
0.019900	20.75	4.19	4.9	31.83	31.00
0.020000	20.80	4.20	4.9	31.83	31.00

1

CURRENT DATE: 03-20-2006  
CURRENT TIME: 11:05:09

FILE DATE: 3/20/2006  
FILE NAME: jn5

.....  
FHWA CULVERT ANALYSIS .....

HY-8, VERSION 6.1 .....

.....  
C . SITE DATA CULVERT SHAPE, MATERIAL, INLET  
U .....  
L . INLET OUTLET CULVERT . BARRELS  
V . ELEV. ELEV. LENGTH . SHAPE SPAN RISE MANNING INLET  
NO. (ft) (ft) (ft) . MATERIAL (ft) (ft) n TYPE  
1 . 2501.08 2499.50 144.01 . 1 RCB 7.00 6.00 .013 IMPR SDT REC .  
2 . . . . .  
3 . . . . .  
4 . . . . .  
5 . . . . .  
6 . . . . .  
.....

## SUMMARY OF CULVERT FLOWS (cfs)

FILE: jn5

DATE: 3/20/2006

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY ITR
2506.36	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2507.16	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2507.87	220.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2508.51	280.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2509.11	340.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2509.67	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2510.21	460.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2510.72	520.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2511.22	580.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2511.54	621.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2512.28	700.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING

.....

## SUMMARY OF ITERATIVE SOLUTION ERRORS

FILE: jn5

DATE: 3/20/2006

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
2506.36	0.000	100.00	0.00	0.00
2507.16	0.000	160.00	0.00	0.00
2507.87	0.000	220.00	0.00	0.00
2508.51	0.000	280.00	0.00	0.00
2509.11	0.000	340.00	0.00	0.00
2509.67	0.000	400.00	0.00	0.00
2510.21	0.000	460.00	0.00	0.00
2510.72	0.000	520.00	0.00	0.00

ST-RH036608

2511.22	0.000	580.00	0.00	0.00
2511.54	0.000	621.00	0.00	0.00
2512.28	0.000	700.00	0.00	0.00

---

<1> TOLERANCE (ft) = 0.010

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<2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 03-20-2006  
CURRENT TIME: 11:05:09

FILE DATE: 3/20/2006  
FILE NAME: jn5

PERFORMANCE CURVE FOR CULVERT 1 - 1( 7.00 (ft) BY 6.00 (ft)) RCB

DIS- FLOW (cfs)	HEAD- ELEV. (ft)	INLET DEPTH (ft)	OUTLET DEPTH (ft)	CONTROL <F4> (ft)	TYPE	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	TW OUTLET VEL. (fps)	TW OUTLET VEL. (fps)
-----------------------	------------------------	------------------------	-------------------------	-------------------------	------	---------------	---------------	---------------	---------------	---------------	-------------------------------	-------------------------------

100.00	2506.36	5.28	5.28	1-S2n	1.27	1.85	1.31	1.30	10.87	11.02
160.00	2507.16	6.08	6.08	5-S2n	1.76	2.54	1.85	1.79	12.38	12.79
220.00	2507.87	6.79	6.79	5-S2n	2.20	3.14	2.34	2.24	13.45	14.06
280.00	2508.51	7.43	7.43	5-S2n	2.61	3.68	2.80	2.66	14.26	15.05
340.00	2509.11	8.03	8.03	5-S2n	3.01	4.19	3.24	3.06	14.98	15.86
400.00	2509.67	8.59	8.59	5-S2n	3.40	4.67	3.67	3.46	15.56	16.53
460.00	2510.21	9.13	9.13	5-S2n	3.78	5.13	4.08	3.84	16.11	17.11
520.00	2510.72	9.64	9.64	5-S2n	4.15	5.57	4.47	4.22	16.63	17.61
580.00	2511.22	10.13	10.13	5-S2n	4.51	5.99	4.87	4.59	17.02	18.06
621.00	2511.54	10.46	9.75	5-S2n	4.76	6.00	5.13	4.84	17.29	18.33
700.00	2512.28	11.07	11.20	6-FFc	5.23	6.00	6.00	5.32	16.67	18.81

El. inlet face invert 2501.08 ft El. outlet invert 2499.50 ft  
El. inlet throat invert 2501.00 ft El. inlet crest 2504.18 ft

\*\*\*\*\* SITE DATA \*\*\*\*\* CULVERT INVERT \*\*\*\*\*

INLET STATION	0.00 ft
INLET ELEVATION	2504.00 ft
OUTLET STATION	152.00 ft
OUTLET ELEVATION	2499.50 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0104
CULVERT LENGTH ALONG SLOPE	144.01 ft

\*\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*\*

BARREL SHAPE	BOX
BARREL SPAN	7.00 ft
BARREL RISE	6.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	IMPR SDT RECT
INLET EDGE AND WALL	BEVELED EDGE TOP (26-45 DEG WINGWALL)
INLET DEPRESSION	YES

3

CURRENT DATE: 03-20-2006  
CURRENT TIME: 11:05:09

FILE DATE: 3/20/2006  
FILE NAME: jn5

.....  
IMPROVED INLET FOR CULVERT 1 - 1( 7.00 (ft) BY 6.00 (ft)) RCB

DIS- CHARGE Flow	HEAD- WATER Elev.	INLET CONTROL Depth	OUTLET CONTROL Depth	TYPE <F4>	CREST FLOW Elev.	FACE CONTROL Elev.	THROAT CONTROL Elev.	TAILWATER Elev.
(cfs)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)
100	2506.36	5.28	5.28	1-S2n	2506.36	2503.52	2503.76	2500.80
160	2507.16	6.08	6.08	5-S2n	2507.16	2504.42	2504.77	2501.29
220	2507.87	6.79	6.79	5-S2n	2507.87	2505.21	2505.68	2501.74
280	2508.51	7.43	7.43	5-S2n	2508.51	2505.93	2506.50	2502.16
340	2509.11	8.03	8.03	5-S2n	2509.11	2506.60	2507.27	2502.56
400	2509.67	8.59	8.59	5-S2n	2509.67	2507.63	2508.01	2502.96
460	2510.21	9.13	9.13	5-S2n	2510.21	2508.08	2508.72	2503.34
520	2510.72	9.64	9.64	5-S2n	2510.72	2508.59	2509.45	2503.72
580	2511.22	10.13	10.13	5-S2n	2511.22	2509.16	2510.19	2504.09
621	2511.54	10.46	9.75	5-S2n	2511.54	2509.59	2510.71	2504.34
700	2512.28	11.07	11.20	6-FFc	2512.15	2510.50	2511.78	2504.82

.....  
\*\*\*\* SIDE-TAPERED RECTANGULAR IMPROVED INLET \*\*\*  
FACE WIDTH 11.00 ft  
SIDE TAPER (4:1 TO 6:1) (X:1) 4.00  
.....

4

CURRENT DATE: 03-20-2006  
CURRENT TIME: 11:05:09

FILE DATE: 3/20/2006  
FILE NAME: jn5

.....  
TAILWATER  
.....

\*\*\*\*\* REGULAR CHANNEL CROSS SECTION \*\*\*\*\*

BOTTOM WIDTH 7.00 ft  
SIDE SLOPE H/V (X:1) 0.0  
CHANNEL SLOPE V/H (ft/ft) 0.010  
MANNING'S n (.01-0.1) 0.013  
CHANNEL INVERT ELEVATION 2499.50 ft  
CULVERT NO.1 OUTLET INVERT ELEVATION 2499.50 ft

\*\*\*\*\* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (ft/s)	SHEAR (psf)
100.00	2500.80	1.705	1.30	11.02	0.81
160.00	2501.29	1.686	1.79	12.79	1.12
220.00	2501.74	1.657	2.24	14.06	1.39
280.00	2502.16	1.627	2.66	15.05	1.66
340.00	2502.56	1.596	3.06	15.86	1.91
400.00	2502.96	1.567	3.46	16.53	2.16
460.00	2503.34	1.538	3.84	17.11	2.40
520.00	2503.72	1.511	4.22	17.61	2.63
580.00	2504.09	1.486	4.59	18.06	2.86
621.00	2504.34	1.469	4.84	18.33	3.02
700.00	2504.82	1.437	5.32	18.81	3.32

.....  
ROADWAY OVERTOPPING DATA  
.....

ROADWAY SURFACE PAVED  
EMBANKMENT TOP WIDTH 100.00 ft  
CREST LENGTH 100.00 ft  
OVERTOPPING CREST ELEVATION 2513.70 ft  
.....



1

CURRENT DATE: 03-20-2006  
CURRENT TIME: 13:55:30

FILE DATE: 3/20/2006  
FILE NAME: JH

.....  
..... FHWA CULVERT ANALYSIS .....  
..... HY-8, VERSION 6.1 .....  
.....

.....  
C SITE DATA CULVERT SHAPE, MATERIAL, INLET  
U .....  
L INLET OUTLET CULVERT BARRELS  
V ELEV. ELEV. LENGTH SHAPE SPAN RISE MANNING INLET  
NO. (ft) (ft) (ft) MATERIAL (ft) (ft) n TYPE  
1 2520.00 2518.00 210.01 2 RCP 4.00 4.00 .013 CONVENTIONAL  
2 . . . . .  
3 . . . . .  
4 . . . . .  
5 . . . . .  
6 . . . . .  
.....

.....  
SUMMARY OF CULVERT FLOWS (cfs) FILE: JH DATE: 3/20/2006

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY ITR
2522.02	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2522.57	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2523.03	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2523.45	125.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2523.86	150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2524.29	175.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2524.75	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2524.96	210.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2525.86	250.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2526.93	275.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2527.25	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 OVERTOPPING

.....

.....  
SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: JH DATE: 3/20/2006

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
2522.02	0.000	50.00	0.00	0.00
2522.57	0.000	75.00	0.00	0.00
2523.03	0.000	100.00	0.00	0.00
2523.45	0.000	125.00	0.00	0.00
2523.86	0.000	150.00	0.00	0.00
2524.29	0.000	175.00	0.00	0.00
2524.75	0.000	200.00	0.00	0.00
2524.96	0.000	210.00	0.00	0.00

2525.86	0.000	250.00	0.00	0.00
2526.93	0.000	275.00	0.00	0.00
2527.25	0.000	300.00	0.00	0.00

.....  
<1> TOLERANCE (ft) = 0.010  
.....

<2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 03-20-2006  
CURRENT TIME: 13:55:30

FILE DATE: 3/20/2006  
FILE NAME: JH

PERFORMANCE CURVE FOR CULVERT 1 - 2( 4.00 (ft) BY 4.00 (ft)) RCP

DIS- CHARGE FLOW (cfs)	HEAD- WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	<P4> TYPE (ft)	FLOW DEPTH (ft)	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (fps)	TW DEPTH (fps)	OUTLET VEL. (fps)	TW VEL. (fps)
50.00	2522.02	2.02	2.02	1-S2n	1.13	1.47	1.07	1.29	9.23	9.71	
75.00	2522.57	2.57	2.57	1-S2n	1.40	1.81	1.31	1.73	10.39	10.86	
100.00	2523.03	3.03	3.03	1-S2n	1.65	2.11	1.66	2.14	10.11	11.69	
125.00	2523.45	3.45	3.45	1-S2n	1.87	2.38	1.78	2.54	11.53	12.32	
150.00	2523.86	3.86	3.86	1-S2n	2.08	2.61	2.01	2.93	11.85	12.82	
175.00	2524.29	4.29	4.29	5-S2n	2.29	2.83	2.23	3.31	12.14	13.24	
200.00	2524.75	4.75	4.75	5-S2n	2.50	3.02	2.52	3.83	12.02	13.71	
210.00	2524.96	4.96	4.47	4-FFt	2.59	3.09	2.59	4.05	12.24	13.89	
250.00	2525.86	5.86	5.85	4-FFt	2.95	3.33	2.95	4.42	12.59	14.15	
275.00	2526.93	6.52	6.93	4-FFt	3.21	3.46	4.00	4.78	10.94	14.38	
300.00	2527.25	7.25	6.65	3-M1f	4.00	3.59	4.00	5.15	11.94	14.58	

El. inlet face invert 2520.00 ft El. outlet invert 2518.00 ft  
El. inlet throat invert 0.00 ft El. inlet crest 2520.00 ft

\*\*\*\*\* SITE DATA \*\*\*\*\* CULVERT INVERT \*\*\*\*\*

INLET STATION 0.00 ft  
INLET ELEVATION 2520.00 ft  
OUTLET STATION 210.00 ft  
OUTLET ELEVATION 2518.00 ft  
NUMBER OF BARRELS 2  
SLOPE (V/H) 0.0095  
CULVERT LENGTH ALONG SLOPE 210.01 ft

\*\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*\*

BARREL SHAPE CIRCULAR  
BARREL DIAMETER 4.00 ft  
BARREL MATERIAL CONCRETE  
BARREL MANNING'S n 0.013  
INLET TYPE CONVENTIONAL  
INLET EDGE AND WALL GROOVED END PROJECTION  
INLET DEPRESSION NONE

3

CURRENT DATE: 03-20-2006  
CURRENT TIME: 13:55:30

FILE DATE: 3/20/2006  
FILE NAME: JH

.....  
TAILWATER  
.....

\*\*\*\*\* REGULAR CHANNEL CROSS SECTION \*\*\*\*\*

BOTTOM WIDTH 4.00 ft  
SIDE SLOPE H/V (X:1) 0.0  
CHANNEL SLOPE V/H (ft/ft) 0.010  
MANNING'S n (.01-0.1) 0.013  
CHANNEL INVERT ELEVATION 2518.00 ft  
CULVERT NO.1 OUTLET INVERT ELEVATION 2518.00 ft

\*\*\*\*\* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
50.00	2519.29	1.508	1.29	9.71	0.80
75.00	2519.73	1.457	1.73	10.86	1.08
100.00	2520.14	1.408	2.14	11.69	1.34
125.00	2520.54	1.363	2.54	12.32	1.58
150.00	2520.93	1.321	2.93	12.82	1.83
175.00	2521.31	1.283	3.31	13.24	2.06
200.00	2521.83	1.235	3.83	13.71	2.39
210.00	2522.05	1.216	4.05	13.89	2.53
250.00	2522.42	1.186	4.42	14.15	2.76
275.00	2522.78	1.158	4.78	14.38	2.98
300.00	2523.15	1.133	5.15	14.58	3.21

.....  
ROADWAY OVERTOPPING DATA  
.....

ROADWAY SURFACE PAVED  
EMBANKMENT TOP WIDTH 100.00 ft  
CREST LENGTH 100.00 ft  
OVERTOPPING CREST ELEVATION 2527.90 ft  
.....

1

CURRENT DATE: 02-28-2006  
CURRENT TIME: 15:31:27

FILE DATE: 2/28/2006  
FILE NAME: JN25

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.....
FHWA CULVERT ANALYSIS .....
HY-8, VERSION 6.1 .....
.....
C .      SITE DATA      CULVERT SHAPE, MATERIAL, INLET
U .....
L . INLET  OUTLET CULVERT . BARRELS
V . ELEV.  ELEV. LENGTH . SHAPE      SPAN  RISE  MANNING  INLET
NO.. (ft)  (ft)  (ft)  . MATERIAL  (ft) (ft)  n      TYPE
. 1 . 2510.00 2509.00 175.00 . 3 RCP      4.00 4.00 .013  CONVENTIONAL
. 2 .
. 3 .
. 4 .
. 5 .
. 6 .
.....

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SUMMARY OF CULVERT FLOWS (cfs) FILE: JN25 DATE: 2/28/2006

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY ITR
2510.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2511.27	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2511.99	72.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2512.57	108.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2513.07	144.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2513.28	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2513.99	216.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2514.47	252.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2515.00	288.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2515.60	324.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
2516.27	360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00 0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: JN25 DATE: 2/28/2006

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
2510.00	0.000	0.00	0.00	0.00
2511.27	0.000	36.00	0.00	0.00
2511.99	0.000	72.00	0.00	0.00
2512.57	0.000	108.00	0.00	0.00
2513.07	0.000	144.00	0.00	0.00
2513.28	0.000	160.00	0.00	0.00
2513.99	0.000	216.00	0.00	0.00
2514.47	0.000	252.00	0.00	0.00

2515.00	0.000	288.00	0.00	0.00
2515.60	0.000	324.00	0.00	0.00
2516.27	0.000	360.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010

<2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 02-28-2006  
CURRENT TIME: 15:31:27

FILE DATE: 2/28/2006  
FILE NAME: JN25

PERFORMANCE CURVE FOR CULVERT 1 - 3( 4.00 (ft) BY 4.00 (ft)) RCP

DIS- CHARGE FLOW (cfs)	HEAD- WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	<F4>	FLOW TYPE (ft)	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
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0.00	2510.00	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.00	2511.27	1.27	1.27	1-S2n	0.88	0.99	0.79	0.50	6.78	5.73	
72.00	2511.99	1.99	1.99	1-S2n	1.27	1.43	1.28	0.74	6.92	7.13	
108.00	2512.58	2.58	2.58	1-S2n	1.58	1.78	1.48	0.92	8.52	8.06	
144.00	2513.07	3.07	3.07	1-S2n	1.86	2.07	1.77	1.13	8.93	9.04	
160.00	2513.28	3.28	3.28	1-S2n	1.98	2.19	1.89	1.20	9.15	9.35	
216.00	2513.99	3.99	3.99	1-S2n	2.38	2.56	2.26	1.32	9.85	9.84	
252.00	2514.47	4.47	4.47	5-S2n	2.64	2.78	2.58	1.43	9.84	10.28	
288.00	2515.00	5.00	5.00	5-S2n	2.93	2.96	2.86	1.53	10.00	10.67	
324.00	2515.60	5.60	5.52	2-M2c	3.27	3.14	3.14	1.62	10.23	11.02	
360.00	2516.27	6.27	6.00	2-M2c	4.00	3.28	3.28	1.71	10.90	11.34	

El. inlet face invert 2510.00 ft El. outlet invert 2509.00 ft  
El. inlet throat invert 0.00 ft El. inlet crest 2510.00 ft

\*\*\*\* SITE DATA \*\*\*\* CULVERT INVERT \*\*\*\*

INLET STATION 100.00 ft  
INLET ELEVATION 2510.00 ft  
OUTLET STATION 275.00 ft  
OUTLET ELEVATION 2509.00 ft  
NUMBER OF BARRELS 3  
SLOPE (V/H) 0.0057  
CULVERT LENGTH ALONG SLOPE 175.00 ft

\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*

BARREL SHAPE CIRCULAR  
BARREL DIAMETER 4.00 ft  
BARREL MATERIAL CONCRETE  
BARREL MANNING'S n 0.013  
INLET TYPE CONVENTIONAL  
INLET EDGE AND WALL SQUARE EDGE WITH HEADWALL  
INLET DEPRESSION NONE

3

CURRENT DATE: 02-28-2006  
CURRENT TIME: 15:31:27

FILE DATE: 2/28/2006  
FILE NAME: JN25

.....  
TAILWATER  
.....

\*\*\*\*\* REGULAR CHANNEL CROSS SECTION \*\*\*\*\*

BOTTOM WIDTH 10.00 ft  
SIDE SLOPE H/V (X:1) 5.0  
CHANNEL SLOPE V/H (ft/ft) 0.030  
MANNING'S n (.01-0.1) 0.025  
CHANNEL INVERT ELEVATION 2509.00 ft  
CULVERT NO.1 OUTLET INVERT ELEVATION 2509.00 ft

\*\*\*\*\* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	2509.00	0.000	0.00	0.00	0.00
36.00	2509.50	1.562	0.50	5.73	0.94
72.00	2509.74	1.648	0.74	7.13	1.38
108.00	2509.92	1.698	0.92	8.06	1.72
144.00	2510.13	1.747	1.13	9.04	2.12
160.00	2510.20	1.761	1.20	9.35	2.25
216.00	2510.32	1.784	1.32	9.84	2.47
252.00	2510.43	1.803	1.43	10.28	2.68
288.00	2510.53	1.820	1.53	10.67	2.86
324.00	2510.62	1.834	1.62	11.02	3.04
360.00	2510.71	1.847	1.71	11.34	3.20

.....  
ROADWAY OVERTOPPING DATA  
.....

ROADWAY SURFACE PAVED  
EMBANKMENT TOP WIDTH 40.00 ft  
CREST LENGTH 200.00 ft  
OVERTOPPING CREST ELEVATION 2517.50 ft  
.....



1

CURRENT DATE: 02-28-2006  
CURRENT TIME: 11:24:11

FILE DATE: 2/28/2006  
FILE NAME: JN2

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.....
.....  FHWA CULVERT ANALYSIS  .....
.....  HY-8, VERSION 6.1      .....
.....
.....  C .      SITE DATA      CULVERT SHAPE, MATERIAL, INLET
.....  U .....
.....  L . INLET  OUTLET  CULVERT . BARRELS
.....  V . ELEV.  ELEV.  LENGTH . SHAPE      SPAN  RISE  MANNING  INLET
..... NO.. (ft)   (ft)   (ft) . MATERIAL   (ft) (ft)   n      TYPE
..... 1 . 2537.50 2536.50 140.00 . 2 RCP      2.00 2.00 .013  CONVENTIONAL .
..... 2 .
..... 3 .
..... 4 .
..... 5 .
..... 6 .
.....

```

SUMMARY OF CULVERT FLOWS (cfs) FILE: JN2 DATE: 2/28/2006

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
2537.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2538.25	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2538.67	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2539.01	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2539.31	22.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2539.61	27.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2539.69	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2540.32	38.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2540.77	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2541.42	49.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
2542.24	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: JN2 DATE: 2/28/2006

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
2537.50	0.000	0.00	0.00	0.00
2538.25	0.000	5.50	0.00	0.00
2538.67	0.000	11.00	0.00	0.00
2539.01	0.000	16.50	0.00	0.00
2539.31	0.000	22.00	0.00	0.00
2539.61	0.000	27.50	0.00	0.00
2539.69	0.000	29.00	0.00	0.00
2540.32	0.000	38.50	0.00	0.00

2540.77	0.000	44.00	0.00	0.00
2541.42	0.000	49.50	0.00	0.00
2542.24	0.000	55.00	0.00	0.00

.....  
<1> TOLERANCE (ft) = 0.010  
.....

<2> TOLERANCE (%) = 1.000

2

CURRENT DATE: 02-28-2006  
CURRENT TIME: 11:24:11

FILE DATE: 2/28/2006  
FILE NAME: JN2

PERFORMANCE CURVE FOR CULVERT 1 - 2( 2.00 (ft) BY 2.00 (ft)) RCP

DIS- FLOW (cfs)	HEAD- ELEV. (ft)	INLET DEPTH (ft)	OUTLET DEPTH (ft)	CONTROL <F4> TYPE (ft)	FLOW DEPTH (ft)	NORMAL DEPTH (ft)	CRT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	2537.50	0.00	0.00	0-NF	0.00	0.00	0.00	0.50	0.00	0.00	0.00
5.50	2538.25	0.75	0.75	1-S2n	0.50	0.57	0.37	0.67	6.69	2.99	
11.00	2538.67	1.17	1.17	1-S2n	0.73	0.83	0.63	0.75	6.58	3.84	
16.50	2539.01	1.51	1.51	1-S2n	0.92	1.02	0.82	0.82	6.80	4.42	
22.00	2539.31	1.81	1.81	1-S2n	1.09	1.19	0.99	0.88	7.11	4.87	
27.50	2539.61	2.11	2.11	5-S2n	1.26	1.33	1.13	0.94	7.51	5.34	
29.00	2539.69	2.19	2.19	5-S2n	1.31	1.37	1.17	0.98	7.60	5.57	
38.50	2540.32	2.82	2.78	2-M2c	1.67	1.58	1.58	1.02	7.26	5.86	
44.00	2540.77	3.27	2.86	2-M2c	2.00	1.66	1.66	1.06	7.90	6.11	
49.50	2541.42	3.78	3.92	2-M2c	2.00	1.74	1.74	1.10	8.54	6.35	
55.00	2542.24	4.36	4.74	2-M2c	2.00	1.83	1.83	1.14	9.12	6.56	

El. inlet face invert 2537.50 ft El. outlet invert 2536.50 ft  
El. inlet throat invert 0.00 ft El. inlet crest 2537.50 ft

\*\*\*\* SITE DATA \*\*\*\* CULVERT INVERT \*\*\*\*

INLET STATION 100.00 ft  
INLET ELEVATION 2537.50 ft  
OUTLET STATION 240.00 ft  
OUTLET ELEVATION 2536.50 ft  
NUMBER OF BARRELS 2  
SLOPE (V/H) 0.0071  
CULVERT LENGTH ALONG SLOPE 140.00 ft

\*\*\*\* CULVERT DATA SUMMARY \*\*\*\*

BARREL SHAPE CIRCULAR  
BARREL DIAMETER 2.00 ft  
BARREL MATERIAL CONCRETE  
BARREL MANNING'S n 0.013  
INLET TYPE CONVENTIONAL  
INLET EDGE AND WALL SQUARE EDGE WITH HEADWALL  
INLET DEPRESSION NONE

3

CURRENT DATE: 02-28-2006  
CURRENT TIME: 11:24:11

FILE DATE: 2/28/2006  
FILE NAME: JN2

.....  
TAILWATER  
.....

\*\*\*\*\* REGULAR CHANNEL CROSS SECTION \*\*\*\*\*

BOTTOM WIDTH 10.00 ft  
SIDE SLOPE H/V (X:1) 5.0  
CHANNEL SLOPE V/H (ft/ft) 0.030  
MANNING'S n (.01-0.1) 0.025  
CHANNEL INVERT ELEVATION 2537.00 ft  
CULVERT NO.1 OUTLET INVERT ELEVATION 2536.50 ft

\*\*\*\*\* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	2537.00	0.000	0.00	0.00	0.00
5.50	2537.17	1.330	0.17	2.99	0.32
11.00	2537.25	1.415	0.25	3.84	0.48
16.50	2537.32	1.465	0.32	4.42	0.60
22.00	2537.38	1.501	0.38	4.87	0.71
27.50	2537.44	1.535	0.44	5.34	0.83
29.00	2537.48	1.551	0.48	5.57	0.89
38.50	2537.52	1.570	0.52	5.86	0.98
44.00	2537.56	1.587	0.56	6.11	1.05
49.50	2537.60	1.602	0.60	6.35	1.12
55.00	2537.64	1.615	0.64	6.56	1.19

.....  
ROADWAY OVERTOPPING DATA  
.....

ROADWAY SURFACE PAVED  
EMBANKMENT TOP WIDTH 40.00 ft

\*\*\*\*\* USER DEFINED ROADWAY PROFILE

CROSS-SECTION	X	Y
COORD. NO.	ft	ft
1	100.00	2541.40
2	150.00	2540.90
3	250.00	2541.40
4	375.00	2540.77
5	500.00	2542.02

.....

ST-RH036624

GOLDEN VALLEY RANCH

## APPENDIX E

### BASE FLOOD ELEVATION (BFE)

- HEC-RAS OUTPUT

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 Profile: PF 1 130 yd Moses Diversions Unit 1 - RFE

Reach	River Sta	Profile	Q Total (cfs)	Min Chl Elev (ft)	WS Elev (ft)	Chl WS (ft)	Elev Elev (ft)	Elev Slope (ft/ft)	Vel Chl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	43	PF 1	110.00	2665.20	2666.15	2666.15	2666.36	0.011982	3.64	30.22	72.16	0.99
Reach-1	42	PF 1	110.00	2657.58	2658.72	2658.77	2658.95	0.018708	3.93	29.00	90.51	1.19
Reach-1	41	PF 1	110.00	2650.29	2651.07	2651.07	2651.24	0.013004	3.36	32.73	93.67	1.00
Reach-1	40	PF 1	110.00	2643.10	2643.74	2643.68	2643.84	0.009253	2.55	43.21	145.41	0.82
Reach-1	39	PF 1	110.00	2636.80	2638.04	2638.04	2638.18	0.014157	2.95	37.28	138.21	1.00
Reach-1	38	PF 1	110.00	2631.14	2630.29	2630.11	2630.35	0.007064		56.10	137.70	0.00
Reach-1	37	PF 1	110.00	2625.29	2625.73	2625.72	2625.83	0.013621	2.58	42.56	187.10	0.96
Reach-1	36	PF 1	110.00	2618.34	2618.76	2618.75	2618.85	0.014281	2.35	46.86	246.64	0.95
Reach-1	35	PF 1	110.00	2612.16	2612.57	2612.54	2612.65	0.010905	2.35	47.85	227.88	0.86
Reach-1	34	PF 1	110.00	2605.49	2605.97	2605.97	2606.06	0.016238	2.45	44.89	243.92	1.01
Reach-1	33	PF 1	110.00	2599.29	2597.03	2596.79	2597.07	0.004634		68.66	166.38	0.00
Reach-1	32	PF 1	110.00	2592.70	2593.42	2593.42	2593.62	0.012559	3.70	31.24	78.00	1.01
Reach-1	31	PF 1	110.00	2584.72	2585.65	2585.72	2585.98	0.017891	4.66	23.61	52.50	1.22
Reach-1	30	PF 1	110.00	2578.07	2579.17	2579.17	2579.46	0.012066	4.33	25.38	46.85	1.04
Reach-1	29	PF 1	110.00	2571.67	2573.23	2573.13	2573.49	0.007338	4.15	26.53	35.95	0.85
Reach-1	28	PF 1	110.00	2567.57	2568.71	2568.71	2569.01	0.011183	4.41	24.95	42.41	1.01
Reach-1	27	PF 1	110.00	2561.75	2562.55	2562.57	2562.77	0.013865	3.76	29.29	74.40	1.05
Reach-1	26	PF 1	110.00	2556.45	2557.33	2557.29	2557.55	0.009426	3.74	29.45	56.50	0.91
Reach-1	25	PF 1	110.00	2552.38	2552.93	2552.88	2553.00	0.008607	2.03	54.28	244.50	0.76
Reach-1	24	PF 1	110.00	2547.17	2547.75	2547.73	2547.83	0.012652	2.21	49.69	260.77	0.89
Reach-1	23	PF 1	110.00	2541.49	2542.05	2542.02	2542.14	0.010301	2.43	45.26	176.98	0.85
Reach-1	22	PF 1	110.00	2535.58	2536.41	2536.41	2536.62	0.011838	3.67	29.95	69.97	0.99
Reach-1	21	PF 1	110.00	2531.57	2532.13	2531.99	2532.17	0.003509	1.58	69.42	229.91	0.51
Reach-1	20	PF 1	110.00	2526.41	2524.52	2524.52	2524.55	0.040731		85.47	1467.88	0.00
Reach-1	19	PF 1	110.00	2521.49	2522.54	2521.95	2522.54	0.000008	0.10	1204.76	3805.56	0.03
Reach-1	18	PF 1	110.00	2515.20	2515.76	2515.76	2515.93	0.013485	3.29	33.41	101.40	1.01
Reach-1	17	PF 1	110.00	2510.36	2510.73	2510.71	2510.74	0.005157	1.23	166.80	1903.27	0.55
Reach-1	16	PF 1	110.00	2504.47	2505.10	2505.04	2505.20	0.009760	2.62	42.02	141.12	0.85
Reach-1	15	PF 1	110.00	2498.90	2499.51	2499.51	2499.66	0.012642	3.19	34.49	104.62	0.98
Reach-1	14	PF 1	110.00	2494.24	2494.76	2494.68	2494.84	0.007531	2.31	47.66	159.23	0.74
Reach-1	13	PF 1	110.00	2489.62	2490.02	2490.00	2490.12	0.012150	2.55	43.18	178.05	0.91
Reach-1	12	PF 1	110.00	2484.04	2484.65	2484.62	2484.76	0.009544	2.64	41.60	135.38	0.84
Reach-1	11	PF 1	110.00	2478.21	2479.08	2479.08	2479.23	0.012951	3.10	35.49	114.36	0.98
Reach-1	10	PF 1	110.00	2466.59	2472.51	2472.55	2472.84	0.012554	4.55	24.15	42.61	1.07
Reach-1	9	PF 1	110.00	2462.15	2463.02	2463.14	2463.36	0.031775	4.68	23.52	80.11	1.52
Reach-1	8	PF 1	110.00	2458.27	2459.30	2459.30	2459.54	0.011717	3.95	27.87	57.89	1.00
Reach-1	7	PF 1	110.00	2454.89	2455.87	2455.72	2455.95	0.004443	2.24	49.14	115.64	0.61
Reach-1	6	PF 1	110.00	2452.12	2452.68	2452.65	2452.77	0.009835	2.35	46.88	186.68	0.83



HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 Profile: PF 1

*100 y Moses Diversions West 1 - BFC*

Reach	River Sta	Profile	Q Total (cfs)	Min Chl Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Friction # Chl
Reach-1	43	PF 1	110.00	2665.20	2666.15	2666.15	2666.36	0.011982	3.64	30.22	72.16	0.99
Reach-1	42	PF 1	110.00	2657.58	2658.72	2658.77	2658.95	0.018708	3.93	29.00	90.51	1.19
Reach-1	41	PF 1	110.00	2650.29	2651.07	2651.07	2651.24	0.013004	3.36	32.73	93.67	1.00
Reach-1	40	PF 1	110.00	2643.10	2643.74	2643.68	2643.84	0.009253	2.55	43.21	145.41	0.82
Reach-1	39	PF 1	110.00	2636.80	2638.04	2638.04	2638.18	0.014157	2.95	37.28	138.21	1.00
Reach-1	38	PF 1	110.00	2631.14	2630.29	2630.11	2630.35	0.007064	2.58	56.10	137.70	0.00
Reach-1	37	PF 1	110.00	2625.29	2625.73	2625.72	2625.83	0.013621	2.35	42.56	187.10	0.96
Reach-1	36	PF 1	110.00	2618.34	2618.76	2618.75	2618.85	0.014281	2.35	46.86	246.64	0.95
Reach-1	35	PF 1	110.00	2612.16	2612.57	2612.54	2612.65	0.010905	2.35	47.85	227.88	0.86
Reach-1	34	PF 1	110.00	2605.49	2605.97	2605.97	2606.06	0.016238	2.45	44.89	243.92	1.01
Reach-1	33	PF 1	110.00	2599.29	2597.03	2596.79	2597.07	0.004634	3.70	68.66	166.38	0.00
Reach-1	32	PF 1	110.00	2592.70	2593.42	2593.42	2593.62	0.012559	4.66	31.24	78.00	1.01
Reach-1	31	PF 1	110.00	2584.72	2585.65	2585.72	2585.98	0.017891	4.33	23.61	52.50	1.22
Reach-1	30	PF 1	110.00	2578.07	2579.17	2579.17	2579.46	0.012066	4.15	26.53	35.95	0.85
Reach-1	29	PF 1	110.00	2571.67	2573.23	2573.13	2573.49	0.007338	4.41	24.95	42.41	1.01
Reach-1	28	PF 1	110.00	2567.57	2568.71	2568.71	2569.01	0.011183	3.76	29.29	74.40	1.05
Reach-1	27	PF 1	110.00	2561.75	2562.55	2562.57	2562.77	0.013865	3.74	29.45	56.50	0.91
Reach-1	26	PF 1	110.00	2556.45	2557.33	2557.29	2557.55	0.009426	2.03	54.28	244.50	0.76
Reach-1	25	PF 1	110.00	2552.38	2552.93	2552.88	2553.00	0.012652	2.21	49.69	260.77	0.89
Reach-1	24	PF 1	110.00	2547.17	2547.75	2547.73	2547.83	0.010301	2.43	45.26	176.98	0.85
Reach-1	23	PF 1	110.00	2541.49	2542.05	2542.02	2542.14	0.011836	3.67	29.95	69.97	0.99
Reach-1	22	PF 1	110.00	2535.58	2536.41	2536.41	2536.62	0.003509	1.58	69.42	229.91	0.51
Reach-1	21	PF 1	110.00	2531.57	2532.13	2531.99	2532.17	0.040731	0.10	1204.76	3805.66	0.03
Reach-1	20	PF 1	110.00	2526.41	2524.52	2524.52	2524.55	0.000008	3.29	33.41	101.40	1.01
Reach-1	19	PF 1	110.00	2521.49	2522.54	2521.95	2522.54	0.00157	2.62	42.02	141.12	0.85
Reach-1	18	PF 1	110.00	2515.20	2515.76	2515.76	2515.93	0.009760	2.31	34.49	104.62	0.98
Reach-1	17	PF 1	110.00	2510.36	2510.73	2510.71	2510.74	0.012642	2.55	43.18	178.05	0.91
Reach-1	16	PF 1	110.00	2504.47	2505.10	2505.04	2505.20	0.007531	2.31	47.66	159.23	0.74
Reach-1	15	PF 1	110.00	2498.90	2499.51	2499.51	2499.66	0.012642	2.64	41.60	135.38	0.84
Reach-1	14	PF 1	110.00	2494.24	2494.76	2494.68	2494.84	0.009544	3.10	35.49	114.36	0.98
Reach-1	13	PF 1	110.00	2489.62	2490.02	2490.00	2490.12	0.012554	4.55	24.15	42.61	1.07
Reach-1	12	PF 1	110.00	2484.04	2484.65	2484.62	2484.76	0.031775	4.68	23.52	80.11	1.52
Reach-1	11	PF 1	110.00	2478.21	2479.08	2479.08	2479.23	0.011717	3.95	27.87	57.89	1.00
Reach-1	10	PF 1	110.00	2466.59	2472.51	2472.55	2472.84	0.004443	2.24	49.14	115.64	0.61
Reach-1	9	PF 1	110.00	2462.15	2463.02	2463.14	2463.36	0.009835	2.35	46.88	186.68	0.83
Reach-1	8	PF 1	110.00	2458.27	2459.30	2459.30	2459.54					
Reach-1	7	PF 1	110.00	2454.89	2455.87	2455.72	2455.95					
Reach-1	6	PF 1	110.00	2452.12	2452.68	2452.65	2452.77					

GOLDEN VALLEY RANCH

## **APPENDIX F**

### **PLANS – NOT INCLUDED WITH THIS STUDY**